

Publication status: This preprint has not been published elsewhere.

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<https://doi.org/10.1590/SciELOPreprints.17560>

Submitted on: 2026-08-20

Posted on: 2026-09-18 (version 1)

(YYYY-MM-DD)

Beyond the Accreditation Cut-off: A Decision-Aiding Framework for Risk-Proportionate Higher Education Regulation

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Article type: Research article

ABSTRACT

Purpose — This article develops a decision-aiding framework for risk-proportionate higher education regulation, using national external assessment and accreditation (EAA) results for 877 undergraduate programs in Angola. It examines the information lost when a multidimensional assessment is reduced to a binary accreditation decision and asks how distance from the legal cut-off can support proportionate supervision without creating a second accreditation scale. **Design/methodology/approach** — The legal cut-off remains fixed at 60.00%. A signed regulatory deficit, $R = 60 - S$, distinguishes shortfalls from surpluses. The framework combines official performance bands, provisional supervision zones, illustrative indifference and preference thresholds, mandatory-indicator safeguards, contextual review, sensitivity analysis, and exploratory K-means profiles. The proposed thresholds are normative decision-support parameters rather than empirically estimated cut-points and therefore require calibration and validation. **Findings** — The mean score is 56.94%, the median is 60.33%, and 475 of 481 accredited programs (98.75%) are concentrated in level C. Companion multilevel evidence reports a null-model ICC of 0.512, indicating substantial between-HEI variance without identifying its causal mechanisms. These empirical results establish concentration around the legal threshold and heterogeneity within formal accreditation categories; they do not validate the proposed supervisory thresholds. **Originality/value** — The article separates legal accreditation status from analytical supervisory intensity and explicitly distinguishes between empirical evidence and normative decision parameters. Its contribution is a transferable decision architecture in which distance to the cut-off, mandatory dimensions, contextual evidence, institutional dependence, sensitivity analysis, and human review inform regulatory follow-up while preserving the legal accreditation rule.

Keywords: Accreditation, Angola, higher education quality assurance, meta-evaluation, thresholds, multicriteria decision aiding, risk-proportionate regulation.

1. Introduction

Accreditation systems must ultimately convert assessment evidence into a formal decision. The clarity of a cut-off, however, can conceal substantively different cases. In the Angolan EAA results analyzed here, the highest-scoring non-accredited program obtained 59.60%, only 0.40 percentage points below the legal cut-off of 60.00%, whereas the minimum observed score was 10.38%. Programs immediately above the cut-off are likewise legally grouped with much stronger performers. The regulatory problem is therefore not the existence of the cut-off, but the information loss created by dichotomization.

This tension is particularly relevant when quality assurance is based on a multidimensional assessment. In the Angolan EAA model, program evaluation is structured around 11 indicators, 39 standards, and 255 verification criteria. The final score is expressed on a 0–100 scale: level D corresponds to $S < 60.00\%$, level C to $60.00\% \leq S < 80.00\%$, level B to $80.00\% \leq S < 90.00\%$, and level A to $90.00\% \leq S \leq 100.00\%$ (MESCTI, 2022a, 2022b). The formal cut-off of 60.00% therefore serves a legal and administrative function, but it does not exhaust the assessment's informational content.

The proposed framework does not weaken the cut-off, replace accreditation rules with an algorithm, or create a second accreditation system. It separates two questions: whether a program satisfies the formal accreditation rule, and what regulatory response is proportionate to its observed position relative to the minimum standard. The first is a legal classification problem; the second is a decision-support and prioritization problem. Supervisory intensity may therefore vary without altering legal status.

Multiple-criteria decision aiding (MCDA) provides the conceptual bridge between these two questions. Thresholds of indifference, preference, and veto were developed to represent imperfect knowledge, weak differences, and critical deficiencies that should not be treated as precise and fully compensatory (Roy, 1996; Roy et al., 2014; Greco et al., 2016). Applied to quality assurance, these concepts make explicit that small score differences need not imply equally large differences in supervisory response and that mandatory dimensions can constrain compensation. The contribution is therefore not a new scoring scale, but a transparent decision-aiding architecture around an existing legal rule.

This article develops a prototype decision-aiding framework grounded in national results from 877 undergraduate programs assessed in Angola across five phases of the EAA. A companion national analysis of the same database examines institutional, disciplinary, and territorial associations, as well as multilevel dependence. The present article has a distinct purpose: it focuses on the decision architecture surrounding the accreditation cut-off, the information preserved by distance to that cut-off, analytical supervision zones, and the proportionality of regulatory follow-up. Angola provides the empirical setting, but the underlying problem is more general wherever continuous or composite assessment evidence is converted into a consequential categorical accreditation decision.

Angolan law already provides a basis for examining the decision architecture itself. Presidential Decree No. 203/18 defines meta-evaluation as the analysis of the functioning and results of evaluation to improve the process; assigns CNAEES coordination, supervisory, and consistency-assessment functions; and requires that evaluation and accreditation norms, procedures, and mechanisms be examined for relevance, integrity, reliability, and credibility (Presidente da República de Angola, 2018, arts. 3(f), 19, 20, 48). Therefore, the cut-off, aggregation rules, mandatory-indicator safeguards, evaluator consistency, and proportionality of regulatory responses are legitimate objects of system-level scrutiny.

A further reason for caution is that final scores are produced within nested institutional and national contexts. Ricardo & Cruz (2026), using the same 877-program population, reported a null-model ICC of 0.512: 51.20% of the estimated variance lies between HEIs. This is associative rather than causal evidence; it does not identify whether governance, internal quality assurance, staffing, financing, infrastructure, research capacity, or other shared conditions generate the difference. It does show that program scores should not be interpreted as isolated program-level attributes.

Preference modeling and non-compensatory decision rules remain underdeveloped in the Angolan quality-assurance literature. Ricardo & Cruz (2025) introduced preference parameters into the analysis of the EAA model and recommended decision conferences and a non-compensatory multicriteria evaluation. The present article extends that line of inquiry by applying MCDA concepts to formulate a general decision problem in higher education regulation: how to preserve a legal cut-off while avoiding false precision and undifferentiated supervision around it.

Three research questions (RQ) guide the analysis. RQ1 asks what information is obscured when a continuous assessment score is reduced to a binary accreditation outcome. RQ2 asks how distance from the legal cut-off can be translated into transparent, provisional regulatory-risk zones without changing the legal accreditation rule. RQ3 asks whether exploratory, data-driven program profiles are descriptively compatible with the proposition that formally identical accreditation categories contain substantively different supervisory situations.

The stakes of non-accreditation are substantial. Executive Decree No. 148/24 amended Articles 41 and 42 of Executive Decree No. 109/20. For level D ($S < 60.00\%$), the amended rule mandates non-

accreditation, with consequent non-admission of new students in the subsequent academic year or closure, and requires urgent intervention through an improvement plan under INAAAREES monitoring for up to two years. After one year, a level-D institution or program may request a new external assessment if it demonstrates compliance with the improvement plan (MESCTI, 2024b). The amendment is therefore better understood as creating a one-year path to reassessment, rather than simply reducing a two-year admission ban to one year. The social relevance is heightened by limited participation in higher education: the 2023–2024 statistical yearbook reports gross and net enrollment rates of 7.60% and 3.30%, respectively (MESCTI, 2026). Accreditation decisions can therefore affect not only programs and institutions but also students' and families' access to opportunities.

The contribution is methodological, regulatory, and institutional. Empirically, the study documents concentration around the legal threshold and heterogeneity within formal accreditation categories. Normatively, it proposes an auditable decision architecture that separates the legal threshold from analytical decision thresholds, links threshold placement to differentiated follow-up, and embeds calibration, sensitivity analysis, and meta-evaluation in governance. It does not make causal claims, estimate psychometric cut-scores, confer legal status on the proposed zones, or treat exploratory clusters as validation. The architecture, rather than the illustrative numerical values, is the principal transferable contribution.

2. Quality assurance, cut-offs and decision thresholds

This section establishes the conceptual basis for the proposed framework. It first distinguishes assessment from accreditation, then examines the limits of compensatory aggregation, introduces discriminating thresholds from MCDA, and finally explains why human judgment and imperfect knowledge matter in interpreting near-threshold cases.

2.1. Accreditation as a binary legal decision

External quality assurance comprises two linked yet distinct functions. Assessment yields an evidence-based judgment about the quality of a program or institution; accreditation converts that judgment into a formal decision with legal and administrative consequences. International and African quality-assurance frameworks emphasize transparency, comparability, institutional responsibility, and continuous improvement (European Association for Quality Assurance in Higher Education et al., 2015; African Union Commission, 2018). These principles require clear rules and proportionate regulatory action based on the evidence.

A binary decision is attractive because it is unambiguous. It is also lossy. Any cut-off partitions a continuous distribution into two categories and therefore treats observations very close to one another as legally different when they fall on opposite sides of the threshold. This is not a defect of accreditation as such; it is an unavoidable property of threshold rules. The regulatory challenge is to preserve the legal rule while recovering some of the information lost by dichotomization.

2.2. Compensatory scores and mandatory dimensions

Composite scores commonly summarize multidimensional assessments. Such aggregation is useful for communication and comparison, but it can create a compensatory effect: a strong score in one dimension may offset a weakness in another. In quality assurance, full compensation may be inappropriate when certain dimensions represent minimum conditions for safe and credible academic provision.

The Angolan model illustrates this tension. The final score is the arithmetic mean of indicator results, yet five indicators—curriculum, faculty, scientific research, university extension and infrastructure—have mandatory status. The resulting architecture is therefore only partially compensatory. A decision-support model must distinguish the overall score from mandatory requirements and should not permit a favorable aggregate score to offset a critical deficiency when formal rules prohibit such compensation (MESCTI, 2022a, 2022b; Canoquena et al., 2023).

2.3. Indifference, preference and veto in a regulatory context

In MCDA, discriminating thresholds provide a formal way to represent the fact that small numerical differences may not always be substantively meaningful. An indifference threshold q marks the largest difference compatible with practical indifference; a preference threshold p marks a difference large enough to sustain a clearer preference, with $p \geq q \geq 0$; and a veto condition represents a sufficiently serious shortfall to block an otherwise favorable aggregate judgment (Roy, 1996; Roy et al., 2014).

Importantly, these parameters are not merely technical constants. In decision-aiding practice, they should be elicited or co-constructed with relevant decision-makers and analysts. Hence, the numerical thresholds reflect explicit regulatory judgment rather than an analyst-imposed convention (Ricardo, 2023). This logic has already been explored in Angolan higher-education quality assurance: Ricardo & Cruz (2025) analyzed preference parameters in the EAA model and recommended decision conferences involving analysts, policymakers, and stakeholders, as well as a transition to a non-compensatory multicriteria model. The present article develops that line of inquiry specifically around the accreditation cut-off and the proportionality of regulatory follow-up. In the Angolan institutional setting, such calibration is also a governance issue because Presidential Decree No. 203/18 assigns CNAEES responsibilities, including supervising the evaluation and accreditation process and examining the consistency of its norms, procedures, and mechanisms. Preference thresholds therefore become not only modeling parameters but also explicit, auditable assumptions that meta-evaluation can scrutinize.

The present study does not implement a full ELECTRE sorting model because the publicly available dataset lacks disaggregated results for the 11 indicators. Instead, the threshold concepts serve as a transparent decision-aiding layer around the official 60.00% cut-off. They are analytical and operational, not legal, and the proposed score boundaries should therefore be interpreted as policy parameters to be tested rather than as cut-points inferred from the data. A future study with indicator-level data could estimate or elicit criterion-specific thresholds and test methods such as ELECTRE TRI-C or ELECTRE TRI-nC (Almeida-Dias et al., 2010, 2012).

2.4. Human judgment, bounded rationality and imperfect knowledge

Verifying criteria in external assessment is not a mechanical act. Under Executive Decree No. 109/20, the External Assessment Commission comprises highly qualified specialists, typically five to seven members. Evaluators must analyze institutional documentation, identify strengths and weaknesses, and contribute to the preliminary and final reports (MESCTI, 2020). The same regulation establishes safeguards regarding conflicts of interest, independence, and impartiality. These safeguards are essential, but they do not eliminate the need to interpret evidence through professional human judgment. International quality-assurance practice likewise relies on peer-review experts and emphasizes reviewer competence and consistency (European Association for Quality Assurance in Higher Education et al., 2015).

This human component strengthens, rather than weakens, the case for transparent preference thresholds. Bounded rationality implies that decision-makers operate with finite information, time and cognitive capacity rather than under conditions of perfect optimization (Simon, 1955). In addition, professional judgments can vary undesirably among evaluators, even when they act in good faith and apply the same formal framework (Kahneman et al., 2021). In MCDA, discriminating thresholds were developed precisely to cope with imperfect knowledge and with differences that should not automatically be interpreted as substantively decisive (Roy et al., 2014). The argument is therefore not that external evaluators are arbitrary, but that small score differences around a consequential legal cut-off should not be treated as if the assessment process were perfectly precise. Explicit q and p thresholds, reviewer training, documented reasoning and sensitivity analysis are complementary safeguards for accountable judgment.

2.5. Statutory meta-evaluation and institutional governance

Presidential Decree No. 203/18 establishes a governance layer beyond individual accreditation decisions. Articles 19 and 20 assign CNAEES coordination, supervisory, and consistency-assessment functions, while Article 48 subjects evaluation and accreditation norms, procedures, and mechanisms to meta-evaluation for relevance, integrity, reliability, and credibility. This provides the legal basis for periodic examination of the decision architecture's performance.

The framework therefore preserves institutional roles: INAAAREES remains responsible for operational EAA, while CNAEES is relevant where system-level coordination, supervision, consistency assessment and meta-evaluation are engaged. Analytical parameters such as distance to the cut-off, q and p , risk zones and escalation rules should consequently be explicit, auditable and revisable.

2.6. Contextual validity, indicator feasibility and score interpretation

A quality-assurance model can be formally uniform yet operate under conditions of unequal opportunity. Presidential Decree No. 203/18 requires adaptation to the national context, and the external-assessment manual allows evidence-based adaptation of indicators, standards and verification criteria to institutional traditions and contexts (Presidente da República de Angola, 2018, art. 15; MESCTI, 2022a). This does not justify lowering standards; it raises a question of contextual validity: whether the criteria retain comparable meaning and are reasonably attainable across settings.

Indicator 9 (Intercâmbio/Mobility) is illustrative. The manual considers staff and student mobility, international students, foreign faculty, national faculty teaching abroad, research partnerships and researcher mobility (MESCTI, 2022a, Indicator 9). These are legitimate dimensions of internationalization, but their attainment can also depend on mobility flows, language, visa conditions, international networks, financing and the attractiveness of the national academic environment.

Ricardo & Cruz (2025) provide exploratory support for this concern. In 28 program reports with disaggregated results for all 11 indicators, Mobility was among the weakest dimensions in both public and private HEIs. Factor analysis also showed that Mobility loaded strongly on Academic and Scientific Capacity (0.771) and, secondarily, on Operational Management Capacity (0.528), suggesting it is not empirically independent of broader institutional capacities. Because the sample was small and the KMO was 0.584, these findings support a meta-evaluation hypothesis rather than national inference.

Similar caution applies to resource-intensive criteria. For non-public HEIs, investment capacity can be affected by tuition fee structures, regulated prices, cost inflation, and access to alternative financing. Such conditions should be measured as contextual evidence, not used as automatic excuses for non-compliance. The analytical task is to distinguish the quality requirement, observed compliance, and external constraints that affect the cost or pace of compliance.

For threshold design, the implication is limited but important: a final score close to 60.00% should not be interpreted as perfectly precise when aggregating criteria with different levels of controllability, resource intensity, and contextual dependence. Context does not change the legal cut-off; it affects the evidential confidence attached to very small differences around it.

3. Method

The method preserves the legal accreditation rule while adding an analytical layer for regulatory response. It defines the empirical basis and signed regulatory deficit, specifies provisional supervision zones, introduces illustrative discriminative thresholds, and sets out clustering, robustness, and co-construction procedures. All analytical parameters are treated as explicit, revisable decision-support assumptions rather than legal rules.

3.1. Empirical base

The empirical base comprises 877 undergraduate programs assessed in phases 1 to 5 of Angola's EAA process (INAAREES, 2024a, 2024b, 2025, 2026). The primary unit is the assessed program, not a reassessment episode. The same national matrix underlies the companion analysis of institutional effects. However, the analysis here is limited to the final score, the accreditation decision, the official level, and derived threshold variables.

The assessed phases are structurally linked to fields of knowledge: phases 1 and 2 cover Medical and Health Sciences; phase 3 covers Education Sciences; phase 4 covers Science, Technology, Engineering and Mathematics (STEM); and phase 5 covers Humanities, Arts and Social Sciences (HASS). Because phase and field are not independent, this article does not attempt to estimate separate causal effects of either. Their role is contextual rather than explanatory.

3.2. Legal cut-off and regulatory deficit

Let S_i denote the final EAA score of program i . The legal accreditation cutoff is $c = 60.00\%$. The binary legal decision can be written as:

$$A_i = \begin{cases} 1, & \text{if } S_i \geq 60.00\% \\ 0, & \text{if } S_i < 60.00\% \end{cases}$$

To preserve information on proximity to the cut-off, the analysis uses a signed regulatory deficit:

$$R_i = 60.00\% - S_i$$

Positive values of R_i indicate a deficit below the legal threshold; $R_i = 0$ denotes the cut-off; negative values indicate a surplus above the cut-off. This sign convention is useful for regulatory interpretation because larger positive values correspond to larger shortfalls. It also matches the distance measure used in the exploratory clustering results reported below.

3.3. Prototype regulatory risk zones

The prototype translates distance from the legal cut-off into analytical supervision zones. Below 60.00%, the score intervals correspond directly to regulatory-deficit bands: boundary ($0.00 < R \leq 5.00$), moderate ($5.00 < R \leq 15.00$), high ($15.00 < R \leq 30.00$), and critical ($R > 30.00$).

Table 1

Prototype Operational Typology for Threshold-Based Regulatory Risk

Proposed zone	Indicative score	Regulatory reading	Suggested response
Critical risk	$< 30.00\%(R > 30)$	Extreme deficit; analogous to a severe failure or potential veto situation.	Urgent audit, student-protection measures, structural improvement plan and priority reassessment.
High risk	$30.00\% \leq S < 45.00\%(15 < R \leq 30)$	Severe structural insufficiency, although less extreme than the critical zone.	Intensive supervision, mandatory improvement plan and verifiable milestones.
Moderate risk	$45.00\% \leq S < 55.00\%(5 < R \leq 15)$	Insufficient performance with plausible scope for recovery.	Short-cycle improvement plan, periodic monitoring and targeted correction of critical dimensions.
Boundary zone	$55.00\% \leq S < 60.00\%(0 < R \leq 5)$	Near-threshold gray zone; small numerical differences may have limited substantive meaning.	Focused reassessment, documentary verification and specific corrective action.
Minimum-compliance accreditation	$60.00\% \leq S < 80.00\%$	Formally accredited, but within the minimum satisfactory band.	Regular monitoring, reinforcement of mandatory dimensions and preventive follow-up.
Good performance	$80.00\% \leq S < 90.00\%$	Performance clearly above the minimum standard.	Routine supervision and structured sharing of good practices.
Excellence	$90.00\% \leq S \leq 100.00\%$	Excellent performance with potential reference value.	Benchmarking, peer learning and dissemination of practices.

Note. The intervals are analytical policy parameters and do not replace the legal accreditation decision.

This makes the classification internally coherent in deficit space, while leaving the numerical breakpoints explicitly normative. The categories are proposed decision-support classes; they do not alter the legal accreditation scale, are not inferred from clustering, and have not been externally validated.

3.4. Illustrative discriminating thresholds around $c = 60.00$

For the decision-aiding layer, the prototype uses $q = 2.00$ percentage points as an illustrative indifference threshold and $p = 5.00$ percentage points as an illustrative preference threshold around the legal cut-off. Thus, 58.00%–62.00% forms a narrow quasi-indifference neighborhood for analytical attention, while 55.00% and 65.00% mark wider reference points for clearer deficits or surpluses. These values are not estimated from external validation data and should not be interpreted as psychometric confidence limits. They are transparent operational parameters chosen to make the decision logic explicit, contestable and testable.

The broader boundary zone of $55.00\% \leq S < 60.00\%$ should not be confused with the q band. The risk zone is a supervision category below the legal cut-off; q and p are decision-aiding thresholds used to distinguish very small differences from clearer departures around 60.00%. Legal classification remains

unchanged. Future cycles should calibrate q and p using reassessment outcomes, indicator-level measurement error, expert elicitation and sensitivity analysis.

3.5. Exploratory clustering as descriptive compatibility

A K-means analysis previously conducted on the 877 programs tested solutions with two to five clusters and retained a four-cluster solution for operational interpretability (Kaufman & Rousseeuw, 1990). Because the clustering combined continuous performance measures with numerically coded contextual variables and was estimated on the same national dataset used in the present study, it is used only as exploratory segmentation. The clusters are not assumed to represent natural, causal, legally meaningful, or externally validated quality classes, nor are they used to estimate or justify the proposed thresholds.

The value of the clustering is therefore deliberately limited. If the same dataset can be segmented into profiles centered near the cut-off, moderately below it, and substantially below it, this is descriptively compatible with the proposition that the binary non-accredited category is heterogeneous. It is not independent triangulation or validation: performance-related variables affect both the cluster solution and the interpretation of threshold position. The exact boundaries in Table 1 must therefore stand or fall on future calibration, sensitivity, longitudinal evidence, and decision-maker elicitation.

3.6. Robustness and sensitivity protocol

Because the public data do not provide longitudinal outcomes or indicator-level measurement error, q, p , and the analytical risk-zone boundaries cannot be calibrated empirically in the present study. Robustness is therefore specified prospectively as a set of tests to be completed before operational adoption.

The protocol combines stability analysis, which identifies parameter ranges over which classifications remain unchanged, and scenario analysis, which tests alternative parameter combinations (Ricardo, 2023; Bana e Costa et al., 2023). Candidate values of $q = 1.00, 2.00$ and 3.00 percentage points should be paired with $p = 3.00, 5.00$ and 7.00 percentage points, maintaining $p \geq q$. Alternative risk-zone breakpoints around $30.00\%, 45.00\%$ and 55.00% should likewise be tested rather than assumed.

3.7. Co-constructed calibration, statutory governance and meta-evaluation

Before regulatory use, threshold calibration should follow a structured co-construction process rather than an exclusively statistical or analyst-driven choice. Drawing on the decision-conference logic applied to public-sector MCDA in Angola (Ricardo, 2023) and on the EAA preference model proposed by Ricardo & Cruz (2025), calibration should be undertaken through facilitated decision conferences with the principal decision-makers in the national quality-assurance system.

INAAREES should remain central because it executes EAA. CNAEES should participate when calibration concerns the consistency or meta-evaluation of EAA norms, procedures or mechanisms. Experienced evaluators, HEI representatives and decision analysts should also participate so that regulatory judgment, field experience and methodological requirements are considered jointly.

The decision conference should examine anonymized near-threshold and structurally weak cases and determine: what score difference is practically negligible; what difference justifies a different monitoring intensity; what mandatory deficiency warrants escalation regardless of the aggregate score; and whether any criterion exhibits systematic contextual feasibility problems. The resulting q, p , veto-like rules and contextual-review triggers should be documented, tested against historical cases, and subjected to sensitivity analysis.

For each parameter or context-sensitive criterion, the process should record its rationale, intended construct, degree of institutional controllability, plausible external constraints, inter-correlation with other indicators, sensitivity range, reclassification effects, and review date. Indicator 9 is a useful test case because it combines cross-border opportunity conditions with correlations to broader academic-scientific capacity (Ricardo & Cruz, 2025).

4. Results

The results are presented in four steps. First, the national score distribution is examined to identify the information lost through binary classification. Second, distance from the cut-off is interpreted as a basis for differentiated supervision. Third, exploratory clusters are used only as descriptive segmentation. Fourth, these elements are brought together in an illustrative regulatory response matrix. Empirical results and normative decision parameters are kept analytically distinct throughout.

4.1. What the binary decision conceals

Of the 877 programs, 481 were accredited (54.85%), and 396 were not accredited (45.15%). At first sight, the binary result suggests a system with a small majority of successful programs. The level distribution changes that interpretation. No program reached level A; only 6 reached level B; 475 were in level C; and 396 in level D. Consequently, 475 of the 481 accredited programs—98.75%—were concentrated in the minimum satisfactory band ($60.00\% \leq S < 80.00\%$).

The score distribution reinforces the importance of the cut-off. The national mean was 56.94% (SD = 12.89), the median was 60.33%, the first quartile was 48.80%, and the third quartile was 65.30%; observed scores ranged from 10.38% to 89.81%. The median lies only 0.33 percentage points above the legal cut-off. This is a structurally important finding for regulation: the center of the national distribution is almost exactly located at the accreditation threshold.

The binary decision therefore compresses at least three substantively different situations. First, it combines severely underperforming programs with programs that fall just below 60.00%. Second, it combines marginally accredited programs with those comfortably above the cut-off. Third, it cannot, by itself, represent critical shortfalls in mandatory dimensions because those dimensions are not visible in the public final-score dataset.

Table 2

National Descriptive Profile of Final EAA Scores (%)

N	Mean	SD	Median	Q1	Q3	Minimum	Maximum
877	56.94	12.89	60.33	48.80	65.30	10.38	89.81

Table 2 shows that proximity to the legal threshold is not exceptional: the national distribution is centered near 60.00%. This concentration provides the empirical rationale for differentiating supervision by distance from the cut-off without changing accreditation status.

4.2. From a legal cut-off to differentiated supervision

The framework preserves the legal distinction at 60.00% while adding distance from the cut-off as a supervisory signal. A program at 59.00% has $R = 1.00$, whereas one at 40.00% has $R = 20.00$. Both are non-accredited, but their regulatory deficits differ substantially.

Above the cut-off, the same logic distinguishes marginal compliance from stronger performance. A program at 61.00% is legally accredited but remains much closer to the minimum standard than a program at 85.00%. This distinction can inform monitoring intensity without changing legal status.

The proposed q and p thresholds make this interpretation explicit. Scores very close to 60.00% should prompt careful verification rather than exaggerated confidence in small numerical differences, while larger deficits justify stronger intervention. Neither q nor p overrides the legal decision; the thresholds guide the analytical response after formal classification.

4.3. Exploratory clusters as descriptive segmentation

The cluster solution is informative in one limited respect: the group centers occupy substantively different positions relative to the legal threshold. C1 has a mean score of 58.95%, only 1.05 percentage points below the cut-off, and is therefore boundary-like. C2 is further below the cut-off, at 53.36%, with an average regulatory deficit of 6.64 percentage points. C3 is substantially below it, at 40.63%, with an average deficit of 19.37 percentage points and no accredited programs. C4 averages above the cut-off (63.70%), and 78.35% of its programs are accredited.

Table 3
Exploratory K-Means Profiles for the 877 Programs

Cluster	n	%	Mean score	Accredited	Mean R = 60–S	Prudent reading
C1	158	18.02%	58.95%	56.33%	1.05	Intermediate/boundary
C2	151	17.22%	53.36%	45.03%	6.64	Lower-performing
C3	157	17.90%	40.63%	0.00%	19.37	Severely underperforming / vulnerable
C4	411	46.86%	63.70%	78.35%	–3.70	More favorable

Note. Clusters are descriptive profiles, not regulatory categories, and not an external validation sample.

This pattern does not validate the exact thresholds of 30.00%, 45.00%, and 55.00% in Table 1. K-means was not fitted for that purpose; it uses the same sample and includes contextual coding and performance-related information. The defensible interpretation is narrower: the binary non-accredited group is descriptively heterogeneous, and the dataset contains profiles centered at materially different distances from the cut-off. Cluster labels are therefore exploratory descriptors, not substitutes for the regulatory zones, nor independent evidence for the chosen breakpoints.

4.4. A regulatory response matrix

The preceding results identify three elements to consider jointly in regulatory follow-up: formal accreditation status, distance from the 60.00% cut-off, and the possibility that weaknesses in mandatory indicators require escalation. Table 4 translates these elements into an illustrative response matrix. The matrix is a decision-support tool, not a new accreditation scale: it allocates supervisory attention based on legal classification rather than redefining accreditation itself.

Table 4
Illustrative Mapping From Threshold Position to Proportionate Regulatory Action

Decision-support position	Indicative relation to cut-off	Regulatory response
Critical deficit	R > 30.00 (score < 30.00%)	Urgent audit and intensive supervision; student-protection measures; structural

Decision-support position	Indicative relation to cut-off	Regulatory response
		improvement plan; priority reassessment.
High deficit	$15.00 < R \leq 30.00$ ($30.00\% \leq \text{score} < 45.00\%$)	Intensive supervision; mandatory improvement plan; verifiable milestones; scheduled reassessment.
Moderate deficit	$5.00 < R \leq 15.00$ ($45.00\% \leq \text{score} < 55.00\%$)	Time-bound improvement plan; target weak dimensions; monitor progress at shorter intervals.
Boundary below cut-off	$0.00 < R \leq 5.00$ ($55.00\% \leq \text{score} < 60.00\%$)	Focused verification; inspect evidence and mandatory indicators; rapid corrective actions; targeted reassessment.
Near-threshold accredited	$-5.00 \leq R \leq 0.00$ ($60.00\% \leq \text{score} \leq 65.00\%$)	Preventive monitoring; confirm mandatory indicators; avoid interpreting legal accreditation as consolidated quality.
Minimum-compliance accredited	$-20.00 < R < -5.00$ ($65.00\% < \text{score} < 80.00\%$)	Routine risk-based supervision, with progressively lower monitoring burden as evidence strengthens.
High performance	$R \leq -20.00$ ($\text{score} \geq 80.00\%$)	Benchmarking and peer learning, while preserving normal accountability requirements.

Note. The bands are aligned with the deficit logic in Table 1; mandatory-indicator failures may warrant a stronger response than the final score alone would suggest.

Table 4 completes the results section by translating the threshold architecture into an operational logic of proportionate supervision. Programs with the same formal accreditation status need not receive identical follow-up when their deficits, margins above the cut-off, or mandatory-dimension risks differ materially. This distinction between legal status and supervisory intensity is the central decision-aiding result carried into the discussion.

5. Discussion

The discussion distinguishes what the national data empirically establish from what the framework normatively proposes. It considers the informational limits of the legal cut-off, proportionality and non-compensatory safeguards, calibration of q and p , institutional-level implications, transferability beyond Angola, and the role of statutory meta-evaluation.

5.1. The cut-off is necessary but insufficient for regulatory intelligence

The results show that a legal accreditation threshold and a regulatory decision-aiding framework should be treated as complementary rather than competing instruments. The cut-off solves a classification problem: it determines formal accreditation status. The framework addresses an allocation problem: it structures where scarce supervisory attention, technical support and reassessment capacity may be concentrated, subject to mandatory indicators and human review. This distinction is central because it prevents analytical supervision zones from being mistaken for additional legal accreditation categories.

This distinction matters because the Angolan distribution is centered on the cut-off. The median is 60.33%; almost all accredited programs are at level C, and the highest-scoring non-accredited program is only 0.40 percentage points below the legal standard. These empirical results establish concentration and heterogeneity around a consequential threshold; they do not, by themselves, establish where q , p , or regulatory-zone boundaries should be placed. Legal status and regulatory interpretation should therefore remain conceptually distinct.

A threshold-based architecture also reduces the temptation to create simplistic rankings. The purpose is not to order all programs from best to worst, but to identify qualitatively different supervision needs. A boundary case may need documentary clarification and rapid corrective action; a critical case may require structural intervention; and a strong case may be suitable for benchmarking. These correspond to different public administration tasks and provide decision-relevant information for institutional managers, INAAREES, CNAEES, and the ministerial department responsible for the higher-education subsystem.

The paper consequently separates two evidential layers. The empirical layer consists of observed score distributions, formal accreditation outcomes, and exploratory program profiles. The normative layer consists of q , p , risk-zone boundaries, escalation rules, and proposed supervisory responses. The first motivates the regulatory problem; the second is a transparent decision proposal that must be co-constructed, sensitivity-tested, and validated before operational use.

5.2. Proportionality and the non-compensatory safeguard

Proportionality is central to risk-based regulation: regulatory intensity should increase with the seriousness, likelihood, and potential consequences of failure rather than remain uniform across formally similar cases (Organization for Economic Co-operation and Development [OECD], 2025). The proposed model operationalizes this principle by using distance to the cut-off, but distance alone is not sufficient.

The mandatory indicators provide a necessary safeguard against excessive compensation. A program may achieve an aggregate score near or above 60 while still exhibiting a serious weakness in a mandatory dimension. In a mature implementation, the risk framework should therefore be two-dimensional: one axis representing the composite score and distance to the cut-off, and the other representing mandatory-dimension status. A critical mandatory failure should be able to escalate regulatory attention regardless of the aggregate score.

This point is conceptually similar to veto logic in outranking methods, although the present study does not estimate criterion-level veto thresholds. The analogy is useful because it prevents a common misinterpretation: the proposed risk zones are not intended to create a purely compensatory numerical ranking. They are a layer of regulatory organization built around and subordinate to the formal quality-assurance rules.

5.3. Why q and p should be calibrated rather than assumed

The illustrative values $q = 2.00$ and $p = 5.00$ percentage points make the decision logic explicit, but they are not universal constants, psychometric confidence limits, or estimates derived from the observed score distribution. Their defensibility depends on empirical evidence and explicit regulatory judgment. Decision-aiding practice supports co-construction with decision-makers rather than analyst-only selection (Ricardo, 2023), consistent with Ricardo & Cruz's (2025) recommendation for decision conferences in future EAA model development.

Calibration should be operationally centered on INAAREES, with CNAEES involved where consistency assessment or meta-evaluation is engaged. It should combine repeated assessments, structured expert elicitation, indicator-level reliability or measurement error analysis, and sensitivity analysis of alternative q , p , and zone boundaries. Each adopted value should have an explicit rationale and review protocol.

A robust regulatory framework should therefore publish not only its thresholds but also its sensitivity to alternative specifications. Two complementary tests are recommended. Stability analysis asks how far each parameter can move before a program changes supervision zone; scenario analysis evaluates simultaneous alternative parameter configurations. This mirrors a robustness logic previously used in an Angolan ELECTRE TRI-nC application, where model behavior was examined under changes in preference parameters and decision configurations rather than inferred from a single parameter set (Ricardo, 2023), and is consistent with collaborative MCDA approaches that use sensitivity and robustness analysis to build confidence in group-supported conclusions (Bana e Costa et al., 2023).

In the present framework, robustness can be communicated directly by reporting how many programs change their analytical zone and what percentage do so when q , p , or the zone boundaries are varied within plausible ranges. The transition matrix then identifies where instability occurs and whether it is substantively important. These analyses test the consequences of alternative normative specifications; they do not convert the provisional thresholds into empirically estimated cut-points. Used together, reclassification rates and transition matrices make sensitivity visible and communicable in a decision conference while preserving expert judgment and longitudinal validation.^p

5.4. From program scores to institutional supervision

Although this article is intentionally centered on the cut-off, regulatory risk should not be interpreted at the program level in isolation. The companion national analysis by Ricardo & Cruz (2026), using the same 877-program population, found substantial within-institution dependence in final scores: the null-model ICC was 0.512 and remained high in adjusted models (0.479–0.485). Thus, 51.20% of the estimated total variance in the null model is attributable to HEIs. The result is associative, not causal. The result does not demonstrate that an HEI's governance model alone accounts for 51.20% of a program's score; it shows that programs within the same institution are much more similar than those from different institutions, and that shared institutional mechanisms merit direct investigation.

The threshold framework can therefore serve as an early-warning layer for institutional evaluation. If several programs at the same institution fall into critical, high-risk, or boundary zones, the regulator should investigate common mechanisms, such as governance, internal quality assurance, faculty capacity, financing, research, infrastructure, management stability, and organizational culture, rather than treating each program as an unrelated case. Conversely, an isolated weakness in one program within an otherwise stronger institution may warrant a more focused response. This is a regulatory inference, not a causal attribution, and it reinforces the need to avoid interpreting a near-cut-off score as the product of program-level performance alone.

5.4.1. National context, criterion feasibility and the risk of false precision

Substantial within-HEI dependence does not eliminate program-level or contextual variation. Without the 11 disaggregated indicators, the present study cannot determine which dimensions drive particular final scores or whether similar aggregates reflect comparable patterns of strengths and weaknesses. This limits the precision that can defensibly be attached to cases near the cut-off.

Indicator 9 illustrates this limitation. Ricardo & Cruz (2025) observed low Mobility performance in both public and private HEIs and reported factor loadings of 0.771 on Academic and Scientific Capacity and 0.528 on Operational Management Capacity. A low score may therefore reflect genuine weakness in internationalization, broader institutional capacity, external opportunity structures, or some combination of these factors.

Meta-evaluation should accordingly test Indicator 9 for national attainability, discrimination among programs, redundancy with related indicators, and marginal effect on the final score and near-cut-off decisions. The policy objective of internationalization may remain valid even if the indicator's measurement properties require adjustment.

Similar scrutiny is warranted for resource-intensive criteria. Tuition-fee structures may shape the financial capacity of non-public HEIs, alongside regulated prices, cost inflation, access to credit or sponsorship, and other external constraints. These factors do not excuse non-compliance, but they may be relevant to diagnosis, improvement planning and the interpretation of aggregate scores.

5.5. Transferability beyond Angola

The framework is based on the Angolan accreditation architecture, but the underlying problem is general. Any quality-assurance system that translates a continuous or composite assessment into an accreditation decision incurs information loss at the cut-off. The specific values of c , q , p , and the risk-zone boundaries are context-dependent; the architecture is more transferable than the numbers. Equally transferable is the meta-evaluative principle: a regulatory framework should periodically evaluate not only programs and institutions but also the quality, consistency, and consequences of its own evaluation process.

A transferable implementation requires five elements: a transparent legal decision rule; a continuous or ordinal performance measure; explicit treatment of mandatory or non-compensatory criteria; published analytical thresholds for supervisory prioritization; and procedural safeguards, including documentation, human review, and an institutional right of response. Without these safeguards, a risk framework can become an opaque scoring system rather than a legitimate decision-support instrument.

5.6. Statutory meta-evaluation, consistency assessment and the role of CNAEES

Presidential Decree No. 203/18 gives the framework direct policy relevance because the EAA architecture is itself subject to scrutiny. Articles 3(f), 19, 20, and 48 connect CNAEES to coordination, supervision, consistency assessment, and meta-evaluation of evaluation and accreditation norms, procedures, and mechanisms. The framework therefore offers a structured way to generate evidence about how those mechanisms behave.

Potential objects of meta-evaluation include the cut-off, mandatory-indicator treatment, compensatory aggregation, evaluator consistency, q and p risk-zone stability, criterion feasibility and interdependence, and proportionality of regulatory responses. Observable tests include zone reclassification under alternative parameters, instability of near-threshold cases, masking of mandatory weaknesses, systematic indicator underperformance and redundancy across dimensions.

The framework should be evaluated at three levels: program-level validity of the supervision zones; criterion-level contextual validity of indicators and verification criteria; and system-level validity of the rules across cycles, fields, institutions, territories and evaluator teams. Weakness at the second or third level should trigger a review of criteria, parameters, or procedures rather than automatically altering individual legal accreditation decisions.

6. Regulatory implementation framework

A practical implementation can follow eight steps: retain the legal accreditation decision; compute $R = 60 - S$; assign a provisional analytical zone; review mandatory indicators; calibrate q, p and zone boundaries through documented decision conferences; overlay institutional, territorial and contextual evidence; retain an audit trail and institutional right of response; and periodically meta-evaluate

threshold stability, reclassification patterns, criterion behavior, evaluator variability and regulatory consequences. INAAREES should remain operationally central, with CNAEES involved where its statutory consistency-assessment and meta-evaluation functions apply. The model is intended to structure judgment and learning, not replace accountable human decision-making (Ricardo, 2023; Ricardo & Cruz, 2025).

In a GovTech environment, the framework could be implemented through a dashboard that clearly separates legal status from analytical risk (Vasconcelos et al., 2025). It should display the official decision, score, distance to the cut-off, mandatory-indicator alerts, reassessment history, institutional concentration of weak programs, and recommended monitoring pathway. Analytical zones must never be presented as new legal accreditation categories.

The same architecture can support early warning. A program may remain accredited while moving closer to the threshold over successive cycles; another may remain non-accredited while improving rapidly. A longitudinal system can detect both trajectories, which a static binary outcome cannot. Over time, reassessment data can validate whether the proposed zones predict persistence, recovery, or deterioration, and recalibrate q , p , and the intervention rules.

7. Limitations and validation agenda

The principal limitation is the absence of the 11 disaggregated indicator scores in the public 877-program dataset. This prevents criterion-level modeling, indicator-specific thresholds, direct testing of veto logic, and estimation of each indicator's contribution to the final score. Ricardo & Cruz (2025) partially reduce this gap with 28 reports that contain all 11 indicators, but that sample is too small for national inference; their Mobility findings are therefore exploratory triangulation.

Second, the proposed risk-zone boundaries and illustrative q and p values have not been externally validated. They are policy parameters, not legal, predictive, or psychometric thresholds. Third, the data are cross-sectional and do not reveal later improvement, deterioration, or status transitions. Fourth, the K-means solution was estimated on the same dataset and is used only for descriptive triangulation, not to validate the proposed cut-points.

Validation should prioritize longitudinal reassessment outcomes and indicator-level data. These would permit estimation of transition probabilities, comparison with expert judgments, testing of criterion-specific thresholds, and empirical implementation of the proposed stability and scenario analyses.

A subsequent phase could evaluate ELECTRE TRI-C or TRI-nC with explicit reference profiles and non-compensatory safeguards. Parameter elicitation should be documented through decision conferences involving INAAREES and the principal decision-makers, with CNAEES involved when consistency assessment or meta-evaluation is engaged (Almeida-Dias et al., 2010, 2012; Ricardo & Cruz, 2025).

Future research should distinguish model validation from meta-evaluation of the EAA system. For Indicator 9, a national indicator-level database should test whether Mobility remains systematically low after accounting for HEI, field and territory; estimate its marginal contribution to the final score; examine redundancy with related indicators; and test alternative weighting or non-compensatory specifications.

8. Conclusion

Accreditation requires a cut-off, but proportionate regulation requires more information than a binary decision retains. In the 877-program national dataset, the median score is 60.33%; 45.15% of programs are non-accredited; and 98.75% of accredited programs are at level C. The distribution is therefore centered on the minimum standard, making near-threshold interpretation a material regulatory issue.

The proposed framework preserves the legal cut-off while using distance to that cut-off, mandatory-dimension safeguards, contextual evidence, and sensitivity analysis to differentiate supervisory intensity. It also incorporates strong within-HEI dependence without causal overreach and links threshold design to the consistency-assessment and meta-evaluation functions established by Presidential Decree No. 203/18.

Ricardo & Cruz (2025, 2026) provide complementary evidence on indicator structure and institutional dependence. Together with the present results, that evidence supports treating thresholds, aggregation rules, indicator performance and contextual attainability as auditable features of the EAA architecture rather than fixed assumptions.

The prototype remains provisional. Indicator-level and longitudinal data are required to calibrate q and p , validate risk zones, test non-compensatory multicriteria models and examine whether the framework improves supervision. Until then, accreditation should remain legally binary, while analytical supervision may be differentiated, transparent and explicitly subject to meta-evaluation.

Acknowledgements

The author acknowledges MESCTI and INAAREES for publicly disseminating national EAA results, which made this secondary analytical study possible.

Author contributions (CRediT)

Amaro Ricardo: Conceptualization; Methodology; Formal analysis; Investigation; Data curation; Visualization; Writing - original draft; Writing - review & editing.

Conflict of interest

The author declares no conflict of interest.

Ethical considerations

This study uses exclusively publicly available administrative and institutional data and involves no direct participation of human subjects or collection of personal data. Research ethics committee approval was therefore not applicable to this secondary analysis.

Data Availability Statement

All data used and analysed in this study are contained within the article and are derived from publicly available sources cited in the references.

Declaration on the use of artificial intelligence

Generative artificial intelligence was used as an assistive tool for methodological planning, article structuring, translation, and textual harmonization. Scientific interpretation, verification, responsibility, and final editorial decisions remain entirely with the author.

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